CLAIMS:

(1) A **molecule** of the structure R-S_2-L for use as a synthetic membrane anchor or in the preparation of synthetic molecule constructs where:

- R is a chemically reactive functional group;
- S_2 is a spacer linking R to L; and
- L is a lipid selected from the group consisting of diacyl- and dialkyl-glycerolipids, including glycerophospholipids, and sphingosine derived diacyl- and dialkyl-lipids, including ceramide.

(2) The molecule of claim 1 where R is selected from the group including: *bis*(N-hydroxysuccinimidyl), *bis*(4-nitrophenyl), *bis*(pentafluorophenyl), *bis*(pentachlorophenyl).

(3) The molecule of claim 1 or 2 where S_2 is selected from the group including: -$CO(CH_2)_3CO$-, -$CO(CH_2)_4CO$- (adipate (Ad)), and -$CO(CH_2)_5CO$-.

(4) The molecule of any one of claims 1 to 3 where R and S_2 are ester linked.

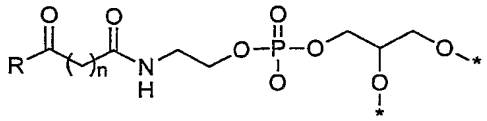
(5) The molecule of any one of claims 1 to 4 where L is a lipid selected from the group consisting of diacyl- and dialkyl-glycerolipids, including glycerophospholipids.

(6) The molecule according to claim 5 where L is selected from the group consisting of: diacylglycerolipids, phosphatidate, phosphatidyl choline, phosphatidyl ethanolamine, phosphatidyl serine, phosphatidyl inositol, phosphatidyl glycerol, and diphosphatidyl glycerol derived from one or more of *trans*-3-hexadecenoic acid, *cis*-5-hexadecenoic acid, *cis*-7-hexadecenoic acid, *cis*-9-hexadecenoic acid, *cis*-6-octadecenoic acid, *cis*-9-octadecenoic acid, *trans*-9-octadecenoic acid, *trans*-11-octadecenoic acid, *cis*-11-octadecenoic acid, *cis*-11-eicosenoic acid or *cis*-13-docsenoic acid.

(7) The molecule according to claim 6 where the lipid is derived from one or more *cis*-destaurated fatty acids.

(8) The molecule according to claim 7 where L is selected from the group consisting of: 1,2-O-dioleoyl-sn-glycero-3-phosphatidylethanolamine (DOPE), 1,2-O-distearyl-sn-glycero-3-phosphatidylethanolamine (DSPE) and *rac*-1,2-dioleoylglycerol (DOG).

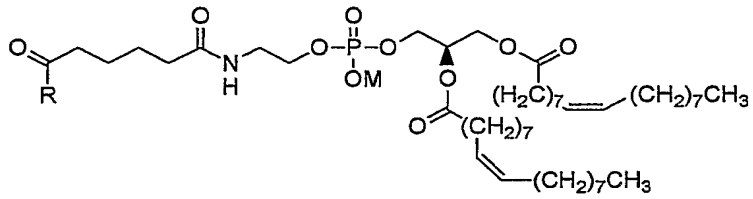
(9) The molecule according to any one of claims 1 to 8 where L is a glycerophospholipid and the molecule includes the substructure:



where n = 3 to 5 and * is other than H.

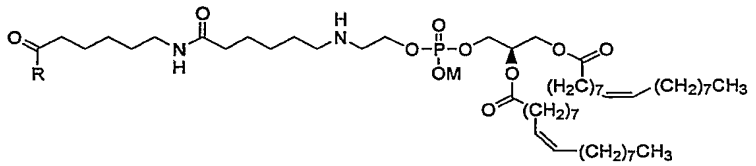
(10) The molecule according to claim 9 where n is 3.

(11) The molecule of claim 1 where the molecule has the structure:



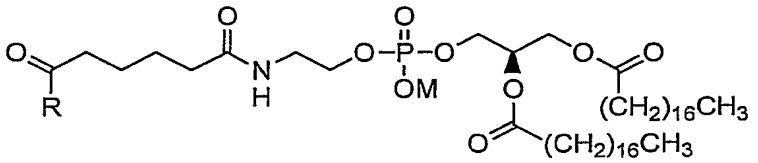
designated Ad-DOPE and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(12) The molecule of claim 1 where the molecule has the structure:



designated sp_1-Ad-DOPE and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(13) The molecule of claim 1 where the molecule has the structure:



designated Ad-DSPE and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(14) A **synthetic molecule construct** of the structure F-S_1-S_2-L where:

- F is an antigen selected from the group consisting of carbohydrates, proteins, lipids, lectins, avidins and biotin;
- S_1-S_2 is a spacer linking F to L; and
- L is a lipid selected from the group consisting of diacyl- and dialkyl-glycerolipids, including glycerophospholipids, and sphingosine derived diacyl- and dialkyl-lipids, including ceramide.

(15) The synthetic molecule construct according to claim 14 where the synthetic molecule construct is water soluble.

(16) The synthetic molecule construct according to claim 14 or 15 where the synthetic molecule construct spontaneously incorporates into a lipid bi-layer when a solution of the synthetic molecule construct is contacted with the lipid bi-layer.

(17) The synthetic molecule construct according to claim 16 where the synthetic molecule construct stably incorporates into the lipid bilayer.

(18) The synthetic molecule construct according to any one of claims 14 to 17 where F, S_1, S_2 and L are covalently linked.

(19) The synthetic molecule construct according to any one of claims 14 to 18 where F is selected from the group consisting of naturally occurring or synthetic glycotopes, antibodies (immunoglobulins), lectins, avidins, and biotin.

(20) The synthetic molecule construct according to claim 19 where F is selected from the group consisting of naturally occurring or synthetic glycotopes or antibodies (immunoglobulins).

(21) The synthetic molecule construct according to any one of claims 14 to 20 where L is a lipid selected from the group consisting of diacyl- and dialkyl-glycerolipids, including glycerophospholipids.

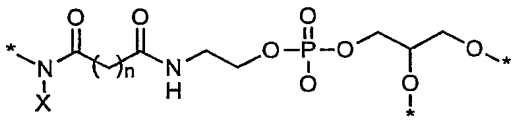
(22) The synthetic molecule construct according to claim 21 where L is selected from the group consisting of: diacylglycerolipids, phosphatidate, phosphatidyl choline, phosphatidyl ethanolamine, phosphatidyl serine, phosphatidyl inositol, phosphatidyl glycerol, and diphosphatidyl glycerol derived from one or more of *trans*-3-hexadecenoic acid, *cis*-5-hexadecenoic acid, *cis*-7-hexadecenoic acid, *cis*-9-hexadecenoic acid, *cis*-6-octadecenoic acid, *cis*-9-octadecenoic acid, *trans*-9-octadecenoic acid, *trans*-11-octadecenoic acid, *cis*-11-octadecenoic acid, *cis*-11-eicosenoic acid or *cis*-13-docsenoic

acid.

(23) The synthetic molecule construct according to claim 22 where the lipid is derived from one or more *cis*-destaurated fatty acids.

(24) The synthetic molecule construct according to claim 23 where L is selected from the group consisting of: 1,2-O-dioleoyl-sn-glycero-3-phosphatidylethanolamine (DOPE), 1,2-O-distearyl-sn-glycero-3-phosphatidylethanolamine (DSPE) and *rac*-1,2-dioleoylglycerol (DOG).

(25) The synthetic molecule construct according to any one of claims 14 to 24 where L is a glycerophospholipid and the synthetic molecule construct includes the substructure:



where n = 3 to 5, X is H or C, and * is other than H.

(26) The synthetic molecule construct according to claim 25 where n is 3.

(27) The synthetic molecule construct according to any one of claims 14 to 24 where S_1-S_2 is selected to provide a water soluble synthetic molecule construct.

(28) The synthetic molecule construct according to any one of claims 14 to 27 where F is a naturally occurring or synthetic glycotope.

(29) The synthetic molecule construct according to claim 28 where F is a naturally occurring or synthetic glycotope consisting of three (trisaccharide) or more sugar units.

(30) The synthetic molecule construct according to claim 28 where F is a glycotope selected from the group consisting of lacto-neo-tetraosyl, lactotetraosyl, lacto-nor-hexaosyl, lacto-iso-octaosyl, globoteraosyl, globo-neo-tetraosyl, globopentaosyl, gangliotetraosyl, gangliotriaosyl, gangliopentaosyl, isoglobotriaosyl, isoglobotetraosyl, mucotriaosyl and mucotetraosyl series of oligosaccharides.

(31) The synthetic molecule construct according to claim 28 where F is selected from the group of glycotopes comprising the terminal sugars GalNAcα1-3(Fucα1-2)Galß; Galα1-3Galß; Galß; Galα1-3(Fucα1-2)Galß; NeuAcα2-3Galß; NeuAcα2-6Galß; Fucα1-2Galß; Galß1-4GlcNAcß1-6(Galß1-4GlcNAcß1-3)Galß; Fucα1-2Galß1-4GlcNAcß1-6(Fucα1-2Galß1-4GlcNAcß1-3)Galß; Fucα1-2Galß1-4GlcNAcß1-6(NeuAcα2-3Galß1-

4GlcNAcß1-3)Galß; NeuAcα2-3Galß1-4GlcNAcß1-6(NeuAcα2-3Galß1-4GlcNAcß1-3)Galß; Galα1-4Galß1-4Glc; GalNAcß1-3Galα1-4Galß1-4Glc; GalNAcα1-3GalNAcß1-3Galα1-4Galß1-4Glc; or GalNAcß1-3GalNAcß1-3Galα1-4Galß1-4Glc.

(32) The synthetic molecule construct according to any one of claims 14 to 31 where when F is a glycotope, L is a glycerophospholipid and S_2 is selected from the group including: -$CO(CH_2)_3CO$-, -$CO(CH_2)_4CO$- (adipate), -$CO(CH_2)_5CO$-, and -$CO(CH_2)_5NHCO(CH_2)_5CO$-.

(33) The synthetic molecule construct according to any one of claims 14 to 32 where S_1 is a C_{3-5}-aminoalkyl selected from the group consisting of: 3-aminopropyl, 4-aminobutyl, or 5-aminopentyl).

(34) The synthetic molecule construct according to claim 33 where S_1 is 3-aminopropyl.

(35) The synthetic molecule construct according to any one of claims 14 to 27 where F mediates a cell-cell or cell-surface interaction.

(36) The synthetic molecule construct according to claim 35 where F is carbohydrate, protein, lipid, lectin, avidin or biotin with an affinity for a component expressed on a targeted cell or surface.

(37) The synthetic molecule construct according to claim 36 where F has an affinity for a component expressed on epithelial cells or extra-cellular matrices.

(38) The synthetic molecule construct according to claim 37 where F has an affinity for a component expressed on the epithelial cells or the extra-cellular matrix of the endometrium.

(39) The synthetic molecule construct according to claim 38 where the component expressed on the epithelial cells or the extra-cellular matrix of the endometrium can be a naturally expressed component or an exogenously incorporated component.

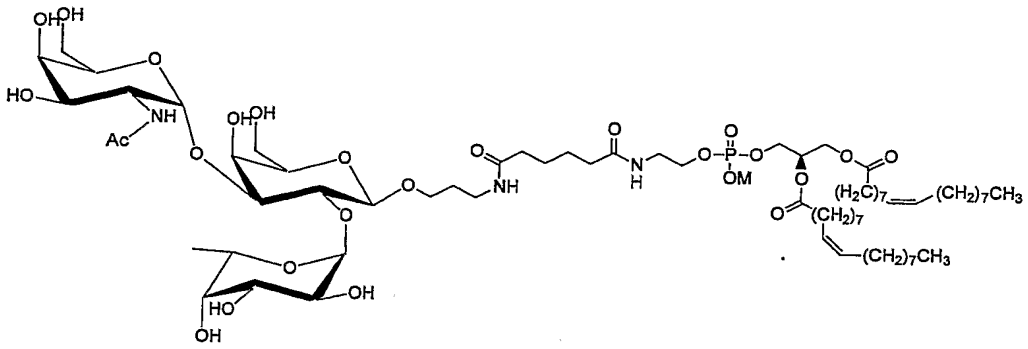
(40) The synthetic molecule construct according to any one of claims 14 to 27 where F mediates a cell-solute interaction.

(41) The synthetic molecule construct according to claim 40 where F is a ligand for a binding molecule where the presence of the binding molecule is diagnostic for a pathological condition.

(42) The synthetic molecule construct according to claim 41 where F is a ligand for an

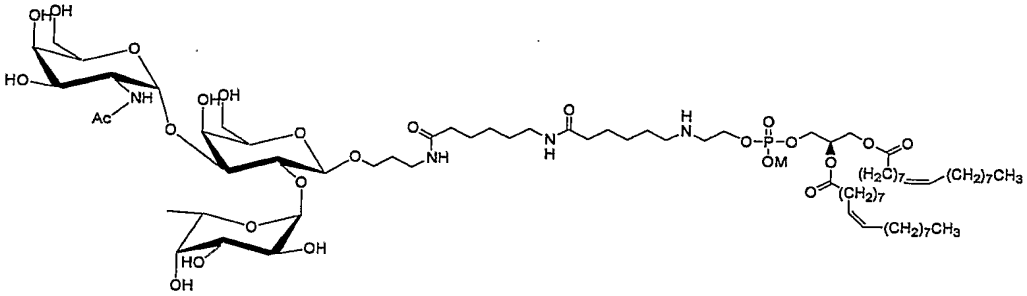
antibody (immunoglobulin).

(43) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



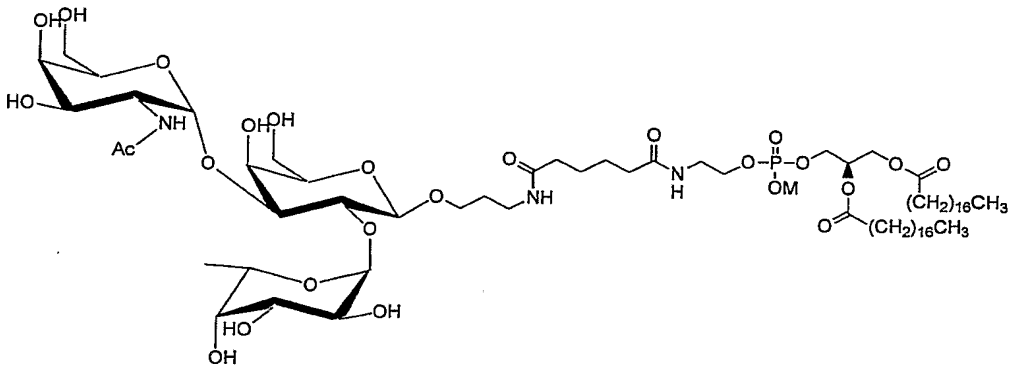
designated A_{tri}-sp-Ad-DOPE (I) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(44) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



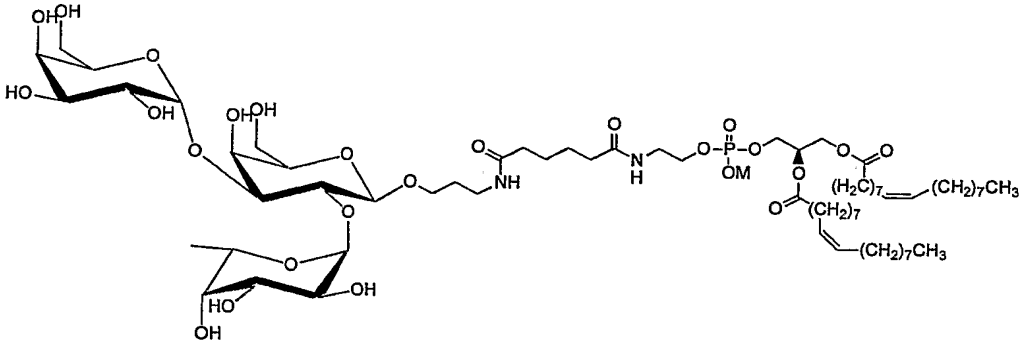
designated A_{tri}-spsp_1-Ad-DOPE (II) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(45) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



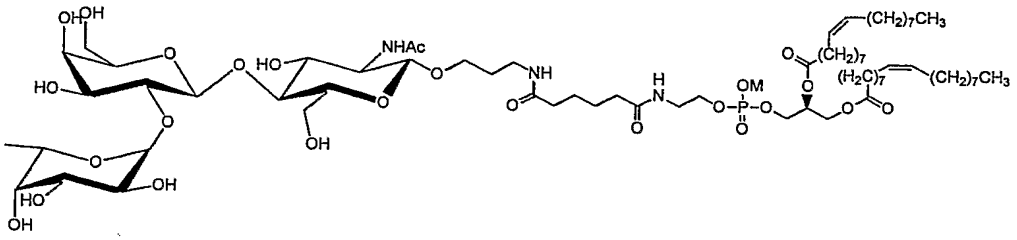
designated A_{tri}-sp-Ad-DSPE (**III**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(46) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



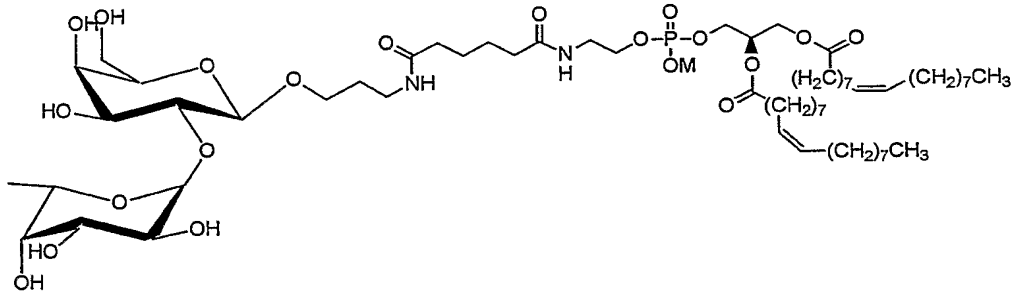
designated B_{tri}-sp-Ad-DOPE (**VI**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(47) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



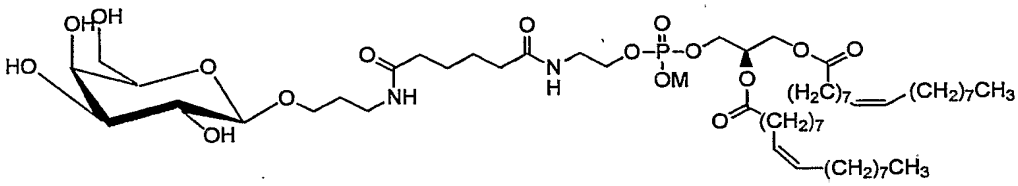
designated H_{tri}-sp-Ad-DOPE (**VII**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(48) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



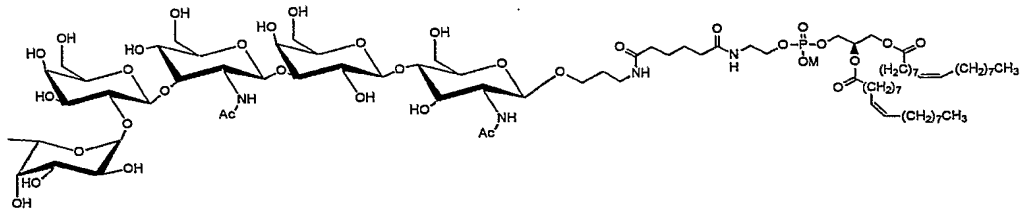
designated H_{dl}-sp-Ad-DOPE (**VIII**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(49) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



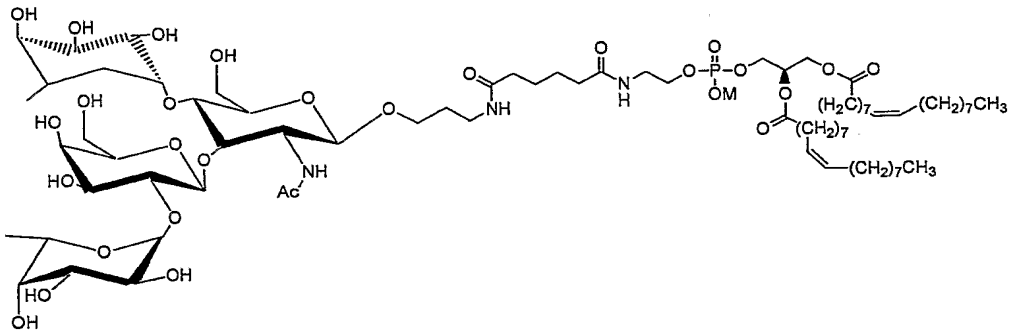
designated Galß$_l$-sp-Ad-DOPE (**IX**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(50) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



designated Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(51) The synthetic molecule construct according to claim 14 where the water soluble synthetic molecule construct has the structure:



designated Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**) and M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(52) A **method** of preparing a synthetic molecule construct of the structure F-S_1-S_2-L including the steps:

- Reacting an activator (A) with a lipid (L) to provide an activated lipid (A-L);
- Derivatising an antigen (F) to provide a derivatised antigen (F-S_1); and
- Condensing A-L with F-S_1 to provide the construct;

where:

A is an activator selected from the group including: *bis*(N-hydroxysuccinimidyl), *bis*(4-nitrophenyl), *bis*(pentafluorophenyl), *bis*(pentachlorophenyl) esters of carbodioic acids (C_3 to C_7);
L is a lipid selected from the group consisting of diacyl- and dialkyl-glycerolipids, including glycerophospholipids, and sphingosine derived diacyl- and dialkyl-lipids, including ceramide.
F is an antigen selected from the group consisting of carbohydrates, proteins, lipids, lectins, avidins or biotin; and
S_1-S_2 is a spacer linking F to L where S_1 is selected from the group including: primary aminoalkyl, secondary aliphatic aminoalkyl or primary aromatic amine; and S_2 is absent or selected from the group including: -$CO(CH_2)_3CO$-, -$CO(CH_2)_4CO$- (adipate), and -$CO(CH_2)_5CO$-.

(53) The method according to claim 52 where the synthetic molecule construct is water soluble.

(54) The method according to claim 51 or 52 where the synthetic molecule construct spontaneously incorporates into a lipid bi-layer when a solution of the synthetic molecule construct is contacted with the lipid bi-layer.

(55) The method according to claim 54 where the synthetic molecule construct stably incorporates into the lipid bilayer.

(56) The method according to any one of claims 52 to 55 where F, S_1, S_2 and L are covalently linked.

(57) The method according to any one of claims 52 to 56 where F is selected from the group consisting of naturally occurring or synthetic glycotopes, antibodies (immunoglobulins), lectins, avidins, and biotin.

(58) The method according to claim 57 where F is selected from the group consisting of naturally occurring or synthetic glycotopes or antibodies (immunoglobulins).

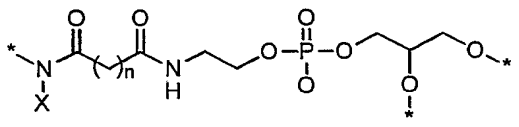
(59) The method according to any one of claims 52 to 58 where L is a lipid selected from the group consisting of diacyl- and dialkyl-glycerolipids, including glycerophospholipids.

(60) The method according to claim 59 where L is selected from the group consisting of: diacylglycerolipids, phosphatidate, phosphatidyl choline, phosphatidyl ethanolamine, phosphatidyl serine, phosphatidyl inositol, phosphatidyl glycerol, and diphosphatidyl glycerol derived from one or more of *trans*-3-hexadecenoic acid, *cis*-5-hexadecenoic acid, *cis*-7-hexadecenoic acid, *cis*-9-hexadecenoic acid, *cis*-6-octadecenoic acid, *cis*-9-octadecenoic acid, *trans*-9-octadecenoic acid, *trans*-11-octadecenoic acid, *cis*-11-octadecenoic acid, *cis*-11-eicosenoic acid or *cis*-13-docsenoic acid.

(61) The method according to claim 60 where the lipid is derived from one or more *cis*-destaurated fatty acids.

(62) The method according to claim 61 where L is selected from the group consisting of: 1,2-O-dioleoyl-sn-glycero-3-phosphatidylethanolamine (DOPE), 1,2-O-distearyl-sn-glycero-3-phosphatidylethanolamine (DSPE) and *rac*-1,2-dioleoylglycerol (DOG).

(63) The method according to any one of claims 52 to 62 where L is a glycerophospholipid and the synthetic molecule construct includes the substructure:



where n = 3 to 5, X is H or C, and * is other than H.

(64) The method according to claim 63 where n is 3.

(65) The method according to any one of claims 52 to 62 where A and S_1 are selected to provide a water soluble synthetic molecule construct.

(66) The method according to any one of claims 52 to 65 where F is a naturally occurring or synthetic glycotope.

(67) The method according to claim 66 where F is a naturally occurring or synthetic glycotope consisting of three (trisaccharide) or more sugar units.

(68) The method according to claim 66 where F is a glycotope selected from the group consisting of lacto-neo-tetraosyl, lactotetraosyl, lacto-nor-hexaosyl, lacto-iso-octaosyl, globoteraosyl, globo-neo-tetraosyl, globopentaosyl, gangliotetraosyl, gangliotriaosyl, gangliopentaosyl, isoglobotriaosyl, isoglobotetraosyl, mucotriaosyl and mucotetraosyl series of oligosaccharides.

(69) The method according to claim 66 where F is selected from the group of glycotopes comprising the terminal sugars GalNAcα1-3(Fucα1-2)Galß; Galα1-3Galß; Galß; Galα1-3(Fucα1-2)Galß; NeuAcα2-3Galß; NeuAcα2-6Galß; Fucα1-2Galß; Galß1-4GlcNAcß1-6(Galß1-4GlcNAcß1-3)Galß; Fucα1-2Galß1-4GlcNAcß1-6(Fucα1-2Galß1-4GlcNAcß1-3)Galß; Fucα1-2Galß1-4GlcNAcß1-6(NeuAcα2-3Galß1-4GlcNAcß1-3)Galß; NeuAcα2-3Galß1-4GlcNAcß1-6(NeuAcα2-3Galß1-4GlcNAcß1-3)Galß; Galα1-4Galß1-4Glc; GalNAcß1-3Galα1-4Galß1-4Glc; GalNAcα1-3GalNAcß1-3Galα1-4Galß1-4Glc; or GalNAcß1-3GalNAcß1-3Galα1-4Galß1-4Glc.

(70) The method according to any one of claims 52 to 69 where when F is a glycotope, L is a glycerophospholipid and S_2 is selected from the group including: $-CO(CH_2)_3CO-$, $-CO(CH_2)_4CO-$ (adipate), $-CO(CH_2)_5CO-$ and $-CO(CH_2)_5NHCO(CH_2)_5CO-$.

(71) The method according to any one of claims 52 to 70 where S_1 is a C_{3-5}-aminoalkyl selected from the group consisting of: 3-aminopropyl, 4-aminobutyl, or 5-aminopentyl.

(72) The method according to claim 71 where S_1 is 3-aminopropyl.

(73) The method according to any one of claims 52 to 65 where F is a synthetic molecule construct that mediates a cell-cell or cell-surface interaction.

(74) The method according to claim 73 where F is carbohydrate, protein or lipid with an affinity for a component expressed on a targeted cell or surface.

(75) The method according to claim 74 where F has an affinity for a component expressed

on epithelial cells or extra-cellular matrices.

(76) The method according to claim 75 where F has an affinity for a component expressed on the epithelial cells or the extra-cellular matrix of the endometrium.

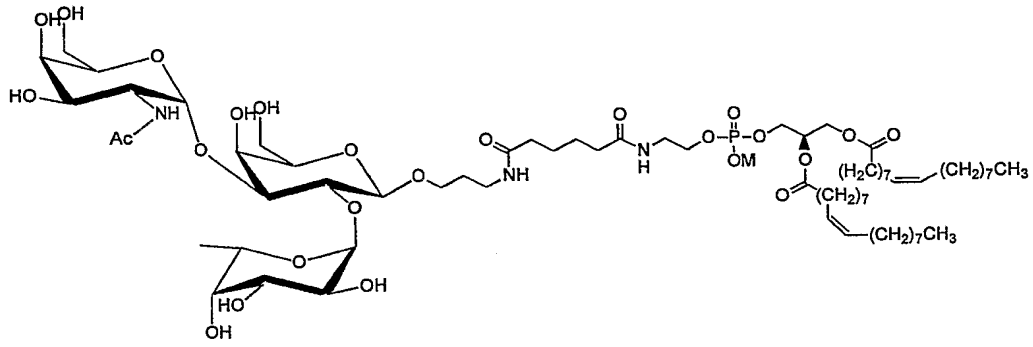
(77) The method according to claim 76 where the component expressed on the epithelial cells or the extra-cellular matrix of the endometrium can be a naturally expressed component or an exogenously incorporated component.

(78) The method according to any one of claims 52 to 65 where F is a synthetic molecule construct that mediates a cell-solute interaction.

(79) The method according to claim 78 where F is a ligand for a binding molecule where the presence of the binding molecule is diagnostic for a pathological condition.

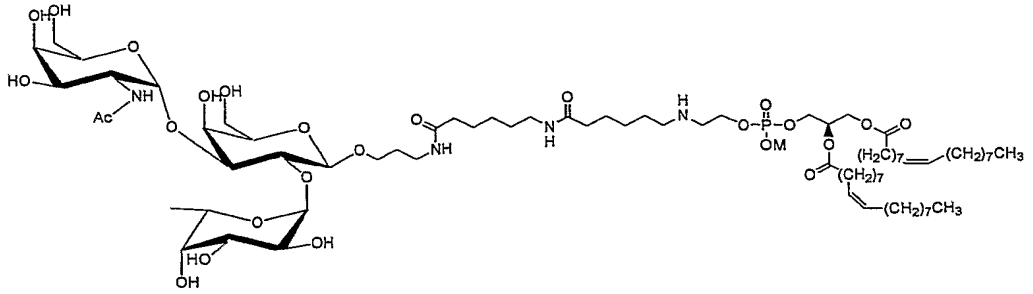
(80) The method according to claim 79 where F is a ligand for an antibody (immunoglobulin).

(81) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



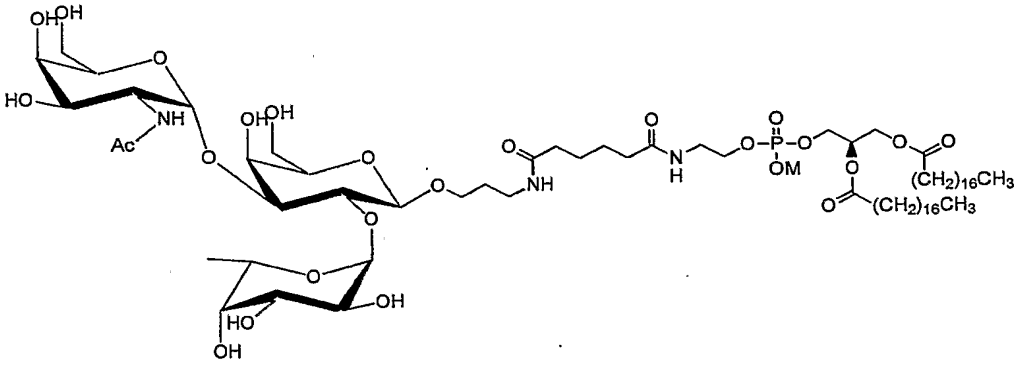
designated A_{tri}-sp-Ad-DOPE (**I**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(82) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



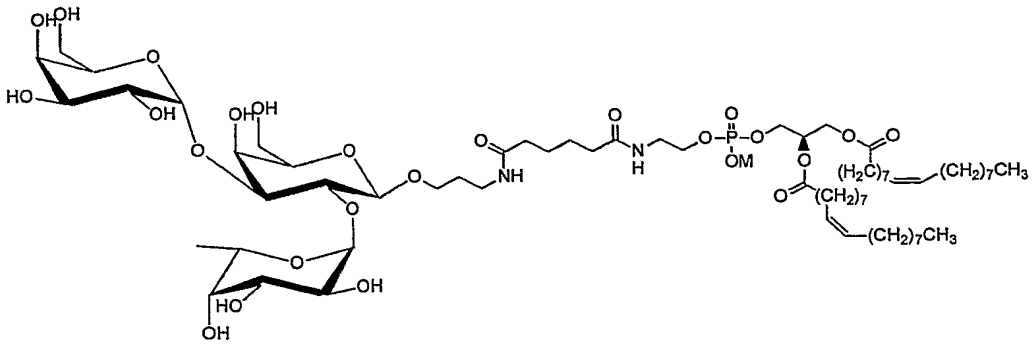
designated A_{tri}-spsp$_1$-Ad-DOPE (**II**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(83) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



designated A_{tri}-sp-Ad-DSPE (**III**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

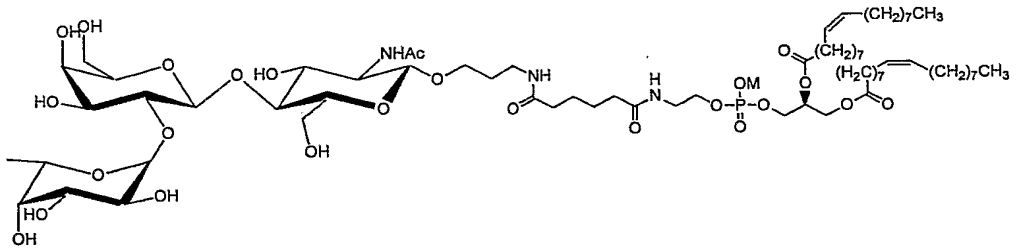
(84) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



designated B_{tri}-sp-Ad-DOPE (**VI**) and where M is typically H, but may be replaced by

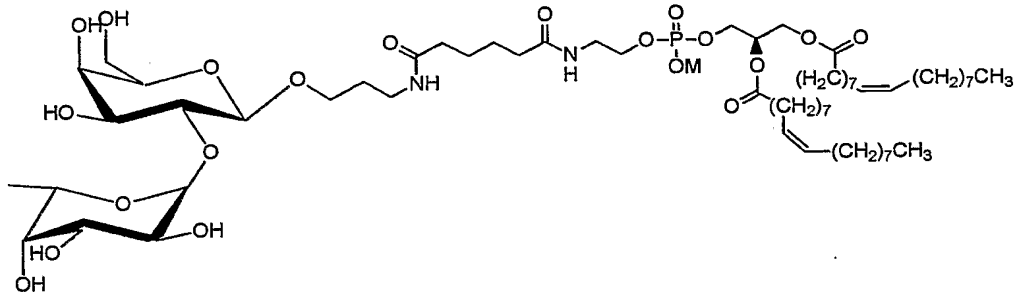
another monovalent cation such as Na^+, K^+ or NH_4^+.

(85) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



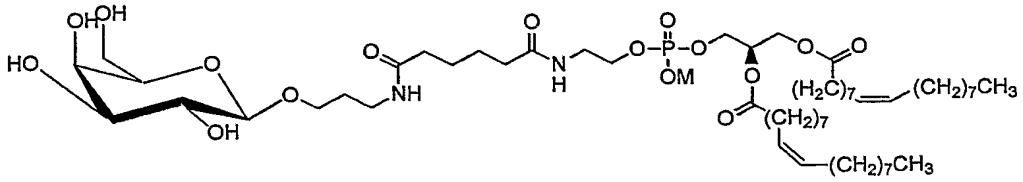
designated H_{tri}-sp-Ad-DOPE (**VII**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(86) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



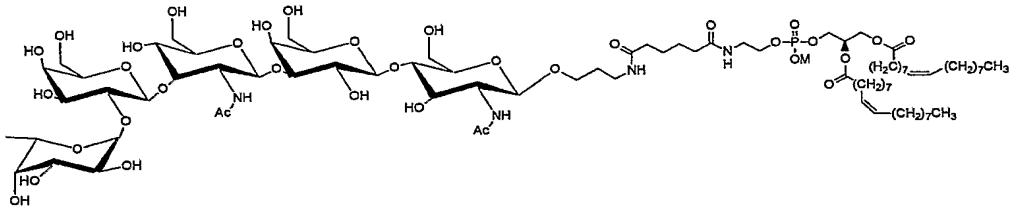
designated H_{di}-sp-Ad-DOPE (**VIII**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(87) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



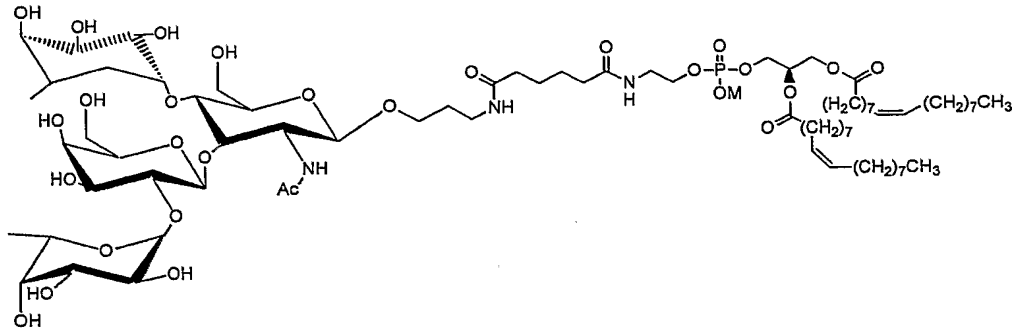
designated Galß$_1$-sp-Ad-DOPE (**IX**);

(88) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



designated Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(89) The method according to claim 52 where the water soluble synthetic molecule construct has the structure:



designated Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**) and where M is typically H, but may be replaced by another monovalent cation such as Na^+, K^+ or NH_4^+.

(90) A water soluble **synthetic molecule construct** prepared by a method according to any one of claims 52 to 89

(91) A **method** of effecting qualitative and/or quantitative changes in the surface antigens expressed by a cell or multi-cellular structure including the step:

- Contacting a suspension of the cell or multi-cellular structure with a water soluble synthetic molecule construct according to any one of claims 14 to 51 or 90 for a time and at a temperature sufficient to effect the qualitative and/or quantitative change in the surface antigens expressed by the cell or multi-cellular structure.

(92) The method according to claim 91 where the cell or multi-cellular structure is of human

or murine origin.

(93) The method according to claim 91 or 92 where the concentration of the water soluble synthetic molecule construct in the suspension is in the range 0.1 to 10 mg/mL.

(94) The method according to any one of claims 91 to 93 where the suspension of the cell or multi-cellular structure is contacted with the water soluble synthetic molecule construct at a temperature in the range 2 to 37 °C.

(95) The method according claim 94 where the suspension of the cell or multi-cellular structure is contacted with the solution of the water soluble synthetic molecule construct at a temperature in the range 2 to 25 °C.

(96) The method according claim 95 where the suspension of the cell or multi-cellular structure is contacted with the solution of the water soluble synthetic molecule construct at a temperature in the range 2 to 4 °C.

(97) The method according to any one of claims 91 to 96 where F is selected from the group of glycotopes comprising the terminal sugars GalNAcα1-3(Fucα1-2)Galß; Galα1-3Galß; Galß; Galα1-3(Fucα1-2)Galß; NeuAcα2-3Galß; NeuAcα2-6Galß; Fucα1-2Galß; Galß1-4GlcNAcß1-6(Galß1-4GlcNAcß1-3)Galß; Fucα1-2Galß1-4GlcNAcß1-6(Fucα1-2Galß1-4GlcNAcß1-3)Galß; Fucα1-2Galß1-4GlcNAcß1-6(NeuAcα2-3Galß1-4GlcNAcß1-3)Galß; NeuAcα2-3Galß1-4GlcNAcß1-6(NeuAcα2-3Galß1-4GlcNAcß1-3)Galß; Galα1-4Galß1-4Glc; GalNAcß1-3Galα1-4Galß1-4Glc; GalNAcα1-3GalNAcß1-3Galα1-4Galß1-4Glc; or GalNAcß1-3GalNAcß1-3Galα1-4Galß1-4Glc.

(98) The method according to claim 97 where F is selected from the group of glycotopes consisting of the oligosaccharides GalNAcα1-3(Fucα1-2)Galß and Galα1-3(Fucα1-2)Galß.

(99) The method according to any one of claim 91 or 96 where the synthetic molecule construct is selected from the group including: A_{tri}-sp-Ad-DOPE (**I**); A_{tri}-spsp_1-Ad-DOPE (**II**); A_{tri}-sp-Ad-DSPE (**III**); B_{tri}-sp-Ad-DOPE (**VI**); H_{tri}-sp-Ad-DOPE (**VII**); H_{di}-sp-Ad-DOPE (**VIII**); Galß$_i$-sp-Ad-DOPE (**IX**); Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**); and Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**).

(100) The method according to any one of claims 91 to 99 where the cell or multi-cellular structure is an embryo.

(101) The method according to claim 100 where F is an attachment molecule where the attachment molecule has an affinity for a component expressed on the epithelial cells or

the extra-cellular matrix of the endometrium.

(102) The method according to claim 101 where the component expressed on the epithelial cells or the extra-cellular matrix of the endometrium can be a naturally expressed component or an exogenously incorporated component.

(103) The method according to any one of claims 91 to 99 where the cell or multi-cellular structure is a red blood cell.

(104) The method according to claim 103 where F is a ligand for a binding molecule where the presence of the binding molecule is diagnostic for a pathological condition.

(105) The method according to claim 104 where F is a ligand for an antibody (immunoglobulin).

(106) A **cell or multi-cellular structure** incorporating a water soluble synthetic molecule construct according to any one of claims 14 to 51 or 90.

(107) The cell or multi-cell structure according to claim 106 where the cell or multi-cellular structure is of human or murine origin.

(108) The cell or multi-cell structure according to claim 106 or 107 where the cell or multi-cell structure is a red blood cell incorporating a water soluble synthetic molecule construct selected from the group including: A_{tri}-sp-Ad-DOPE (**I**); A_{tri}-spsp_1-Ad-DOPE (**II**); A_{tri}-sp-Ad-DSPE (**III**); B_{tri}-sp-Ad-DOPE (**VI**); H_{tri}-sp-Ad-DOPE (**VII**); H_{di}-sp-Ad-DOPE (**VIII**); Galß$_l$-sp-Ad-DOPE (**IX**); Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**); and Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**).

(109) The cell or multi-cell structure according to claim 106 or 107 where the cell or multi-cell structure is an embryo incorporating a water soluble synthetic molecule construct selected from the group consisting of: A_{tri}-sp-Ad-DOPE (**I**); A_{tri}-spsp_1-Ad-DOPE (**II**); A_{tri}-sp-Ad-DSPE (**III**); B_{tri}-sp-Ad-DOPE (**VI**); H_{tri}-sp-Ad-DOPE (**VII**); H_{di}-sp-Ad-DOPE (**VIII**); Galß$_l$-sp-Ad-DOPE (**IX**); Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**); and Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**).

(110) A **kit** comprising a preparation of a molecule according to any one of claims 1 to 13, or a dried preparation or solution of a water soluble synthetic molecule construct according to any one of claims 14 to 51 or 90.

(111) The kit according to claim 110 where the molecule according to any one of claims 1 to 13 is selected from the group consisting of: Ad-DOPE; sp_1-Ad-DOPE; and Ad-DSPE.

(112) The kit according to claim 1 where water soluble synthetic molecule construct according to any one of claims 14 to 51 or 90 is selected from the group consisting of: A_{tri}-sp-Ad-DOPE (**I**); A_{tri}-spsp_1-Ad-DOPE (**II**); A_{tri}-sp-Ad-DSPE (**III**); B_{tri}-sp-Ad-DOPE (**VI**); H_{tri}-sp-Ad-DOPE (**VII**); H_{di}-sp-Ad-DOPE (**VIII**); Galß$_1$-sp-Ad-DOPE (**IX**); Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**); and Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**).

(113) A **kit** comprising a suspension in a suspending solution of cells or multi-cellular structures according to any one of claims 106 to 109.

(114) The kit according to claim 113 where the suspending solution is substantially free of lipid.

(115) The kit according to claim 113 or 114 where the cell or multi-cellular structure is of human or murine origin.

(116) The kit according to any one of claims 113 to 115 where the cells are red blood cells that do not naturally express A- or B-antigen and incorporate a water soluble synthetic molecule construct selected from the group consisting of: A_{tri}-sp-Ad-DOPE (**I**); A_{tri}-spsp_1-Ad-DOPE (**II**); A_{tri}-sp-Ad-DSPE (**III**); B_{tri}-sp-Ad-DOPE (**VI**); H_{tri}-sp-Ad-DOPE (**VII**); H_{di}-sp-Ad-DOPE (**VIII**); Galß$_1$-sp-Ad-DOPE (**IX**); Fucα1-2Galβ1-3GlcNAcβ1-3Galβ1-4GlcNAc-sp-Ad-DOPE (**XII**); and Fucα1-2Galβ1-3(Fucα1-4)GlcNAc-sp-Ad-DOPE (**XIII**).

(117) The kit according to claim 116 where the suspending solution additionally contains one or more antibodies.

(118) The kit according to claim 117 where the cells are sensitivity controls.

(119) A **pharmaceutical preparation** comprising a dried preparation or solution of a water soluble synthetic molecule construct according to any one of claims 14 to 51 or 90.

(120) The pharmaceutical preparation according to claim 119 where the pharmaceutical preparation is in a form for administration by inhalation.

(121) The pharmaceutical preparation according to claim 120 where the pharmaceutical preparation is in a form for administration by injection.

(122) A **pharmaceutical preparation** comprising cells or multi-cellular structures according to any one of claims 106 to 109.

(123) The pharmaceutical preparation according to claim 122 where the cells or multi-cellular structures are of human or murine origin.

(124) The pharmaceutical preparation according to claim 122 or 123 where the pharmaceutical preparation is in a form for administration by inhalation.

(125) The pharmaceutical preparation according to claim 122 or 123 where the pharmaceutical preparation is in a form for administration by injection.